

SPECIAL REPORT: ROADS AS DIKES, DEVILS LAKE BASIN, NORTH DAKOTA

OPTIONS FOR RESOLUTION



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List of Acronyms and Abbreviations

BIA	Bureau of Indian Affairs
DEM	North Dakota Division of Emergency Management
ER	Emergency Relief funding program (FHWA-HQ)
ERFO	Emergency Relief for Federally Owned roads program (FHWA-HQ)
FEMA Region VIII	FEMA Denver Regional Office
FEMA-HQ	FEMA Headquarters
FHWA-HQ	Federal Highway Administration – Headquarters
FHWA-ND	Federal Highway Administration – North Dakota Division
FLHP	Federal Lands Highway Program (FHWA-HQ)
FMA	Flood Mitigation Assistance funding program (FEMA)
HMGP	Hazard Mitigation Grant Program (FEMA)
IA	Individual Assistance funding program (FEMA)
IRR	Indian Reservation Roads
MOU	Memorandum of Understanding
NASS	North Dakota Agricultural Statistics Service
NDDOT	North Dakota Department of Transportation
NFIP	National Flood Insurance Program (FEMA)
PA	Public Assistance funding program (FEMA)
SBA	Small Business Administration
SFO	Support For Others authority (USACE)
SWC	State Water Commission (North Dakota)
USACE	U.S. Army Corps of Engineers

The elevation of Devils Lake has risen 46 feet since 1940, and over 24 feet of the rise has happened since 1993. As roads were raised and culverts were plugged, the roads began to function as dikes, creating potentially unsafe conditions for residents in the area. Local, State and Federal agencies with responsibilities for this area have had on-going concerns about the safety of the roads. Although considerable thought and planning has gone into the development of a multi-jurisdictional approach to the resolution of this problem, progress has been slow and tedious.

The problem began in May 1995, when it was suggested that two culverts in North Dakota State Route 20 (ND 20) be plugged to protect the entrance road into Camp Grafton from flooding. At the time, the maximum lake level was 1435.26 feet. Meanwhile, an additional 12.4-foot rise in the lake level has occurred since May 1995, increasing the risk of road failure and shortening the timeframe to determine and execute a solution. In May 1998, it became evident that the roads were acting as dikes. Maps showing detailed locations of the two areas of concern within the Devils Lake Basin are provided in the Appendix.

An interagency task force was formed in August 2001 to address the problem of roads in some areas of the Devils Lake Basin acting as barriers to the rising waters of Devils Lake. Since the roads were not constructed to function as dikes, there is a potential safety problem for road users and residents living in areas protected by the roads. The intentions are to (1) eliminate or reduce the threat to life, (2) protect property, and (3) provide an acceptable level of access for local residents, police and fire, and businesses.

Two basic alternatives have been considered to resolve the problems posed by roads functioning as dikes. The first would provide for culverts to be placed through road embankments functioning as dikes, allowing the lake waters to equalize on both sides of the roads. This alternative would flood additional land and structures in those areas presently being protected from flooding by the roads. The second alternative provides for a combination of perimeter and parallel dikes that would serve to protect roads and some land.

The task force included representatives from the following organizations:

- North Dakota Department of Transportation (NDDOT)
- North Dakota State Water Commission (SWC)
- North Dakota Division of Emergency Management (DEM)
- Federal Emergency Management Agency (FEMA)
- Federal Highway Administration (FHWA)
- U.S. Army Corps of Engineers, St. Paul District (USACE)
- Bureau of Indian Affairs (BIA)
- Spirit Lake Nation Tribe

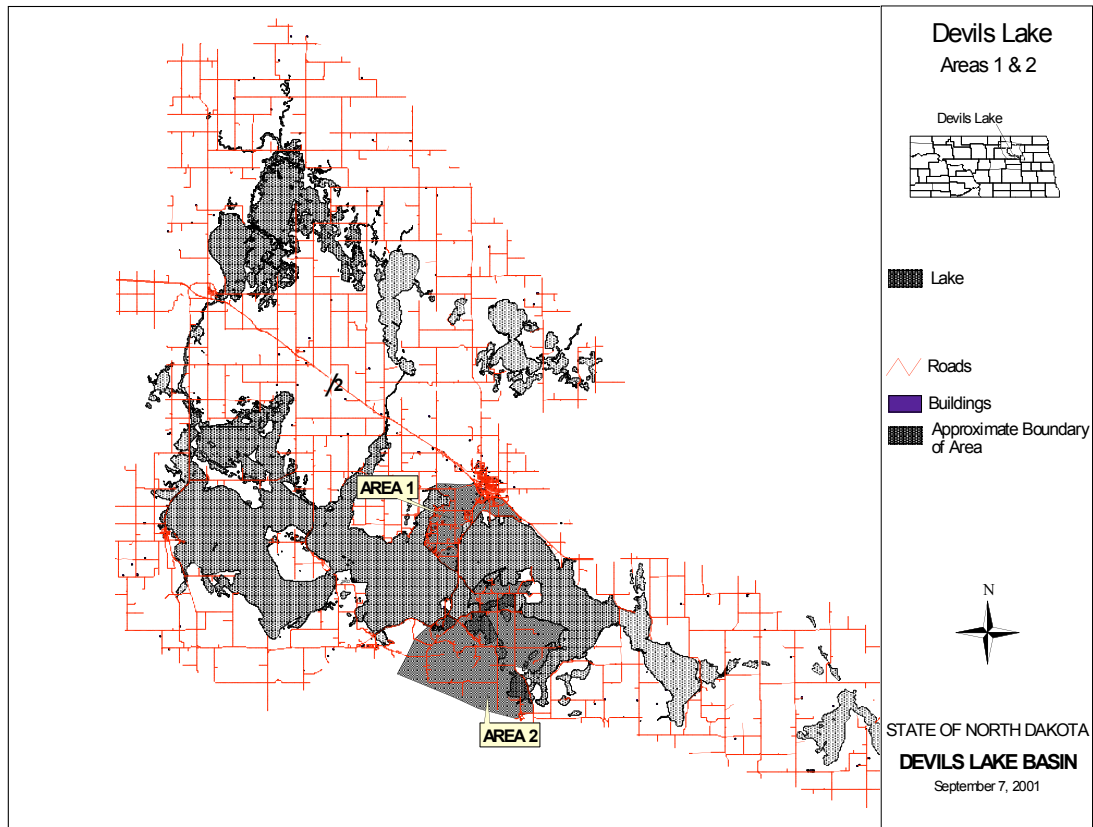


Figure 1 – Map of Devils Lake

This report outlines some of the key issues regarding the subject road segments. To implement any alternative presented in this report, multiple Federal and State agencies must be involved. Technical options available are discussed in Section 2, while Section 3 provides background information for the two affected areas. Section 4 lists the agencies expected to help solve this problem and outlines their potential roles and responsibilities. During the course of the task force's work, several policy issues were raised. These issues are presented in Section 5. The task force believes that these issues should be reviewed in conjunction with the options under consideration.

The engineering and construction costs shown in Section 6 associated with each alternative are drawn from a May 2000 report issued by a surface transportation task force subgroup that was established by FHWA in August 1999. All cost items were re-evaluated during the current task force's work sessions to ensure the items were still applicable. New information from FEMA about the number of residences, amount of land impacted, and other associated impacts and costs per option are presented here for the first time. These data are initial estimates and are presented here for decision-making purposes. These estimates will probably change once a detailed engineering analysis is performed on the selected alternative for each area.

There are three fundamental alternatives that have been deemed technically feasible:

1. Constructing a system of dikes that would be built landward and parallel to the existing roads to allow the elimination of the differential hydrostatic pressure that currently exists on the roads.
2. Construction of dikes between areas of natural high ground (i.e., gaps in the local topography) to minimize the length of the dike needed to protect additional areas.
3. Equalizing the water pressure on both sides of the roads using a controlled release of water via culverts through the existing road embankments.

2.1 PARALLEL DIKES

The road segments considered in this report have been identified as functioning as dikes. The determination was based on the differential hydrostatic pressure found on the lake-ward side of the road embankment. The parallel dike alternative involves constructing a dike that would provide protection for a lake level of 1460 feet on the landward side of the road. In general, the dike would be aligned parallel to the road with a distance between the toe of the dike and the toe of the road embankment being large enough to permit construction of the parallel dike and maintenance on the embankments and the equalization culverts. Once the dike is constructed, the road can be raised to safely function with a lake elevation of 1460 feet. Equalization culverts through the road embankments will eliminate the risk of road embankment failure due to differential hydrostatic pressure.

The left side of Figure 2 shows the existing condition for the roads and the parallel dike alternative.



Figure 2 – Parallel Dikes

2.2 PERIMETER DIKES

Under the perimeter dike alternative, dikes would be placed at locations that minimize the length of the dike due to natural topography. These dikes would be more difficult to construct than parallel dikes because the road functioning as a coffer dam during construction would not protect them. However, the perimeter dikes would typically protect larger areas of land than parallel dikes. Because this option is dependent on natural topography, perimeter dikes are not a viable alternative for all areas, as in the case of the Acorn Ridge Area (Area 1). They are believed to be viable in the eastern boundary of the St. Michael Interior Area (Area 2). These dikes are typically more attractive due to the following:

1. Shorter dike lengths, which lower operation and maintenance costs.
2. Cost savings due to the avoidance of lost land and property.
3. The elimination of the need to elevate roads protected by dikes.

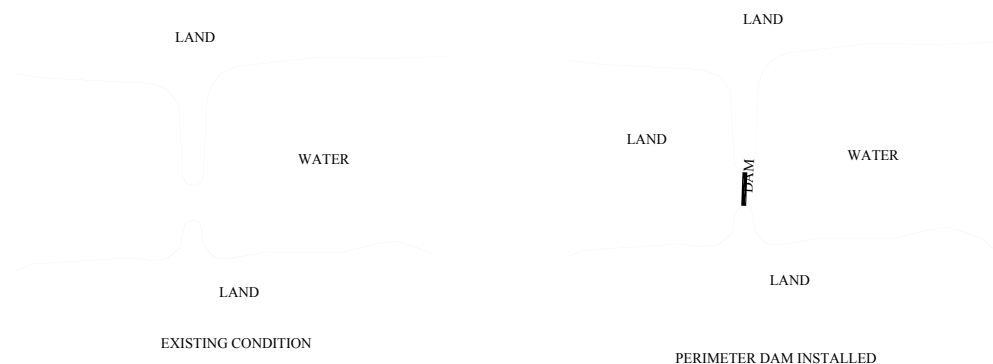


Figure 3 – Perimeter Dikes

2.3 EQUALIZATION

Equalization involves the installation of culverts through the roadbed to equalize the water level, and therefore the hydrostatic forces, on both sides of the road. The road can then be raised to provide service for lake elevations up to 1460 feet. Of all the alternatives presented in this report, equalization would inundate the largest area of land. This alternative would necessitate a proportionately higher road elevation cost and include a higher proportion of land and property costs due to the larger area of inundation. Figure 4 shows a schematic of the equalization approach.



Figure 4 – Schematic of the Equalization Approach

For analysis and report writing purposes, the geographic area protected by the system of roads as dikes was divided into two units: Acorn Ridge and St. Michael Interior. A description of the areas and the specific roads serving to provide protection of the area is provided below.

Maps showing detailed locations of the two areas of concern within the Devils Lake Basin are provided in the Appendix. Information on the number of structures, the size of the affected areas, and the methodology used to determine the alternatives that were viable for each area are also presented below.

3.1 ACORN RIDGE AREA (AREA 1)

The Acorn Ridge Area is an area along the north central shore of the lake and includes the National Guard's Camp Grafton facility. This area includes approximately 1.1 miles of ND 20 acting as a dike. An additional 1.25 miles of Military Road would be inundated under the equalization alternative if road elevations were not included in the solution. The number of primary residential structures that would be impacted in this area under the equalization approach is estimated to be 23. The USACE recently completed an analysis of the alignment for levees associated with protecting both the City of Devil's Lake and some areas between the City and the Acorn Ridge area. The levees would be associated with raising the City's protection to a top of levee elevation of 1460. In the analysis submitted by Barr to the St. Paul District Corps of Engineers (February 2002), the USACE selected levee alternative #2 to design for the Acorn Ridge Area. Figure 5 shows the alignment of the levee segments. This alternative includes levee segments #3 and #4 and the Acorn Ridge Tie-back Section. Based on these levee alignments and using the Devils Lake GIS Database, 51 structures were identified as being impacted (either inundated or isolated) at a lake elevation of 1460 feet. For the 51 structure footprints, some of which are accessory structures, the estimated fair market value is approximately \$2.6M. Of the 51 structures, it is estimated that 5 are in the process of being moved or demolished.

3.2 ST. MICHAEL INTERIOR AREA (AREA 2)

The St. Michael Interior Area (Area 2) is a combination of previous areas under consideration. This is due to the elimination of lower lake elevations from consideration and the fact that the entire St. Michael Interior Area is hydraulically connected at a lake elevation of 1460 feet.

After examination of the parallel dike alternative for selected road segments in Area 2, it was determined to be cost effective to exclude parallel dike alternatives for some of the longer road segments. These include the two ND 20 segments in the area (1.67 and 2.59 miles long) and instead provide protection to the area using perimeter dikes with a shorter length. For the remaining road segments in the area, the length of the parallel dike and the natural topography are primary factors in including costs for a parallel dike to protect these road segments.

The number of primary residential structures is estimated to be 69 within Area 2. Therefore, if the equalization approach is selected, 69 structures would have to be acquired/relocated while these structures would be protected under the parallel and perimeter dike alternatives.

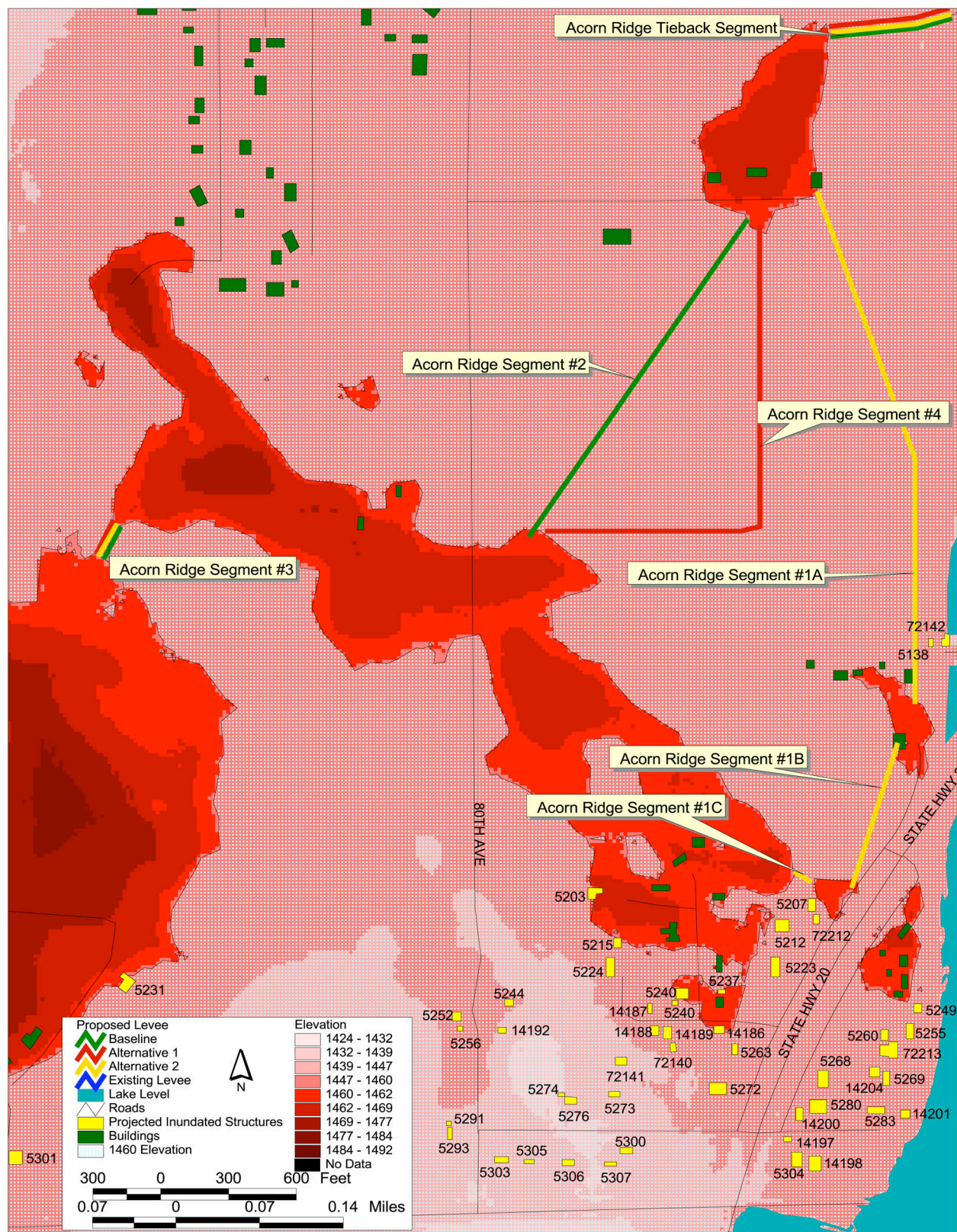


Figure 5 – Acorn Ridge Levee Alternative #2

This section outlines potential roles and responsibilities of each of the member organizations of this task force. In each organization's subsection, a discussion of potential roles is presented, as well as a summary of potential funding sources that may be used in a selected alternative. This information is provided to assist decision-making entities in understanding the capabilities of each organization to collectively resolve this problem.

4.1 NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

The NDDOT has responsibility for constructing and maintaining roads and bridges in the state system. Currently, NDDOT is restricted by Federal regulations from using federal highway funds to raise grades along state highways that are acting as dikes. However, NDDOT can use its Federal or State funds to install a pipe to equalize water on both sides of the roadway, but cannot use its federal highway funding to construct parallel dikes or perimeter dikes. Even if NDDOT did have authority to use federal highway funds to construct parallel or perimeter dikes, it does not have adequate funding to perform this construction.

Special language that permits NDDOT to use federal highway funds to design and construct dikes would need to be included in authorizing legislation should a decision be made to construct parallel dikes, perimeter dikes, and grade raising, with funding made available through FHWA to NDDOT. This would be needed to override the current Federal law that does not allow NDDOT to use federal highway funds to construct dikes. If NDDOT were given this authority, it would inherit ownership and maintenance of these dikes. NDDOT does not have the staff or expertise to manage these structures, therefore, coordination with another state agency, such as the SWC, would be required to assume ownership and take over maintenance and inspection duties. Also, NDDOT does not have the expertise to design dikes or perform construction inspection on dikes, therefore they would need to enter into an arrangement with the USACE or some other entity for dike design and construction monitoring.

4.2 NORTH DAKOTA STATE WATER COMMISSION

The North Dakota SWC and the State Engineer continue to be involved in several key issues concerning the flooding in the Devils Lake Region. Regarding the roads acting as dikes issue, the SWC and the State Engineer has, and will continue, to play a minor role.

The State Engineer is responsible for permitting projects that are constructed on the beds of navigable lakes and streams. The State Engineer is also responsible for permitting the construction of dikes. Any dikes to be constructed below the ordinary high water mark of Devils Lake would require both a sovereign lands permit and a construction permit.

Recently, through a Memorandum of Understanding (MOU) between the SWC and NDDOT, the SWC has assisted the NDDOT in developing an inspection and monitoring program for several State highways acting as dikes in the Devils Lake area. The program will include training on installation, inspection, and instrument monitoring of embankments. The SWC also assisted the NDDOT in preparing a contract for the solicitation of an engineering report for the program. Through this MOU, the SWC will continue to assist the NDDOT with annual joint field inspections and data analyses.

If the NDDOT were given funding and authorization through FHWA to construct dikes, the SWC would be willing to offer further assistance in monitoring and inspection of the newly constructed dikes located along State highways or lands not within the boundaries of the Spirit Lake Nation Reservation. The SWC cannot assume jurisdiction for infrastructure located on the Reservation. In dealing with the ownership issue, the SWC does not own, operate, or maintain dikes in North Dakota, nor does the SWC have any intention of doing so.

Working with the local interests and providing necessary information through public meetings and various other means is an important responsibility for the SWC. They can provide existing survey data and possibly survey work, and can assist in determining future lake levels and the resulting damage, including inundated land areas and structures.

4.3 BUREAU OF INDIAN AFFAIRS

The BIA receives funding for constructing Indian Reservation Roads (IRR) under the current Federal law, TEA-21 (Transportation Efficiency Act for the 21st Century). These funds are allocated to the BIA Division of Transportation by law through the Federal Lands Highway Program (FLHP) of the FHWA. The BIA Division of Transportation distributes these funds for each BIA Region by a formula based on distribution to individual tribes. The BIA Transportation Division and Region Roads Offices administer highway programs on the reservations. The Great Plains Region Office, located in Aberdeen, South Dakota is responsible for the Program on the Spirit Lake Indian Reservation in North Dakota. The Great Plains Region Office, Branch of Roads provides transportation engineering services for planning, design, construction, and rehabilitation of the highways and bridges either on or providing access to the Spirit Lake Reservation. Funds for maintaining the BIA Road System on the Spirit Lake Reservation are provided by annual appropriation of the Department of Interior budget for BIA.

Funds for emergency repairs of the BIA Road System on the Spirit Lake Reservation are provided through the Emergency Relief for Federally Owned (ERFO) roads program. The ERFO Program provides assistance to roads that have been defined as Federal roads. These are roads providing access to and within Federal and Indian lands, including IRR. Funds for the ERFO Program are provided from the Highway Trust Fund. These funds are not to duplicate assistance under another Federal program or compensation from insurance, cost share or any other source.

The intent of the ERFO Program is to pay the unusually heavy expenses to the agencies that manage road systems for the repair and reconstruction of roads, damaged by a natural disaster over a wide area, to pre-disaster conditions.

4.4 FEDERAL EMERGENCY MANAGEMENT AGENCY/ NORTH DAKOTA DIVISION OF EMERGENCY MANAGEMENT

Predicated on a Presidential Disaster Declaration, the following Disaster Assistance Programs would be activated. Many of the programs listed in this section are funded through FEMA but are administered by the State.

- Public Assistance Program (PA)
- Individual Assistance Program (IA)

- Hazard Mitigation Grant Program (HMGP)

The PA Program provides funding for repair or replacement of public infrastructure facilities, county and township roads, public buildings, utilities, etc. The Program, which has a 75/25 Federal/Non-Federal cost share requirement, may also reimburse tribal and local governments and state agencies from the costs of emergency measures required to protect the health and safety of populations in designated disaster areas. Reimbursable measures may include emergency access for fire, ambulance, and police services to occupied residences. The PA Program may also fund hazard mitigation efforts that meet regulatory and policy requirements.

The Individual Assistance (IA) Program provides assistance to individuals impacted by Presidential Disaster Declarations. The IA Program provides temporary housing, food, and other needs of individuals in disaster areas. The Small Business Administration (SBA) Disaster Loan Program may also be activated. The SBA Disaster Loan Program provides low interest loans to individuals and businesses impacted by the disaster. The IA Program is a combination of multiple smaller programs with varying degrees of Federal/State share and eligibility.

The HMGP provides funding for projects that reduce future damages and losses from natural hazards. This Program is managed by the North Dakota Division of Emergency Management and is funded primarily based on a percentage of estimated PA and IA disaster expenditures. Grant applications may come from anywhere in an affected state and is not limited to those counties with declared disasters. The Program funds various kinds of projects, including residential acquisitions, elevations, and flood-proofing or structural flood control efforts. The program cost share is 75% Federal/ 25% Non-Federal.

There are several other FEMA programs that may be of interest with respect to supporting the options discussed in this report.

- Flood Mitigation Assistance (FMA) program
- National Flood Insurance Program (NFIP)

The FMA Program is intended to help States and communities plan and carry out activities that reduce flood risk to structures that are insurable under the NFIP. This Program provides planning assistance and grants for projects that are cost effective and technically feasible. It should be noted that the FMA Program has a limited amount of funds available on a national basis and is relatively small when compared to the funds available through the HMGP. The funds are currently apportioned to states based on the number of repetitive loss structures in the state.

The NFIP makes Federally backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances designed to reduce future flood damage. This Program is managed by FEMA's Federal Insurance and Mitigation Administration (FIMA). FEMA's role in supporting the State may include the acquisition of properties that are either in the alignment of a proposed parallel dike or will become inundated or isolated due to the equalization alternative. For roads that continue to serve residences or other facilities and are not covered by other Federal funding programs, the PA Program may be a viable alternative for

elevating these road segments. Based on preliminary review, a small length of road within the two areas may potentially be considered eligible for PA funds only.

4.5 FEDERAL HIGHWAY ADMINISTRATION

4.5.1 Federal-Aid Highway Program

The Federal-Aid Highway Program provides Federal financial assistance to the states to construct and improve the National Highway System, urban and rural roads, and bridges. The Program, which is administered by FHWA through its division offices in each state, provides funds for general improvements and development of safe highways and roads. The funds are made available through the annual appropriations from the Highway Trust Fund to the individual states. This annual appropriation is referred to as the Federal-Aid Program.

In addition, Congress authorized in Title 23, United States Code, Section 125, a special program from the Highway Trust Fund for the repair or reconstruction of Federal-Aid Highways and roads on Federal lands that have suffered serious damage as a result of (1) natural disasters; or (2) catastrophic failures from an external cause. This Program, commonly referred to as the emergency relief or ER Program, supplements the commitment of resources by states, their political subdivisions, or other Federal agencies to help pay for unusually heavy expenses resulting from extraordinary conditions. This Program is authorized at \$100 million annually.

The roles and responsibilities of the FHWA in ER activities under Section 125, 23 U.S.C., are:

1. Administration of the ER Program through coordination and implementation of disaster relief policies and procedures.
2. Assistance to State, Federal, or other highway agencies in seeking application for funds.
3. Technical assistance to the State, Federal, or other highway agencies in the review, design, repair, and reconstruction of damaged highway facilities.

ER funds are not intended to cover all damage repair costs nor interim emergency repairs that will necessarily restore pre-disaster conditions. State and local highway agencies must expect additional expenditures, changes in project priorities, and some inconvenience to traffic as a result of emergency conditions. State and local governments are responsible for planning and providing for extraordinary conditions. Economic hardship is not a factor in determining repair eligibility. The ERFO and ER funding have the same restrictions.

The ER funds are available at the pro rata share that would normally apply for Federal disaster aid. For interstate highways, the Federal share is 90 percent. For all other highways, the Federal share is 80 percent. Emergency repair work to restore essential traffic, minimize the extent of damage, or protect the remaining facilities, accomplished in the first 180 days after the occurrence of the disaster, may be reimbursed at 100 percent Federal share. During this 180-day period, permanent repair work is reimbursed at normal pro rata share unless it is performed as part of emergency repair work.

For eligible basin flooding disasters, ER funding will generally be limited to engineering and construction costs associated with grade raises of highways and bridges. Construction of dikes is

outside of FHWA's authority in 23 U.S.C. and the purpose and mission of the Highway Trust Fund. In a memorandum to the FHWA-ND dated March 31, 2000, FHWA-HQ stated that the FHWA would no longer participate in further grade raises for those roadway sections currently impounding water in the Devils Lake Basin due to safety concerns. However, if these road sections were equalized, to eliminate the differential hydrostatic pressure concerns, or if the sections were modified by other agencies to address safety concerns, FHWA would reconsider its position to participate in future grade raises, should they become necessary.

4.5.2 Federal Lands Highway Program

The FLHP of the FHWA administers highway programs in cooperation with Federal land managing agencies through its three Divisions (the Central Division, located in Lakewood, Colorado, is responsible for North Dakota). The Divisions provide transportation engineering services for planning, design, construction, and rehabilitation of the highways and bridges on or providing access to federally owned lands.

The primary purpose of the FLHP is to provide funding for a coordinated program of public roads that serve the transportation needs of the Federal lands that are not a state or local government responsibility. The FLHP provides funds for forest highways, IRR, park roads and parkways, public lands highways and refuge roads. The Federal Lands Highway divisions are also responsible for administering the ERFO, which is part of the FHWA ER Program. The Federal Lands Highway divisions are also responsible for administering the ERFO, which, as mentioned previously, is part of the FHWA ER program.

The ERFO Program provides assistance to roads that have been defined as Federal roads. These are roads providing access to and within Federal and Indian lands, including IRR. This is different from the Emergency Relief Program for Federal-Aid Highways such as the Interstate system. The Federal share for the repair of Federal roads is 100 percent under the ERFO Program. Funds are provided from the Highway Trust Fund. These funds are not to duplicate assistance under another Federal program or compensation from insurance, cost share, or any other source.

The intent of the ERFO Program is to pay the unusually heavy expenses to the agencies that manage road systems for the repair and reconstruction of roads, damaged by a natural disaster over a wide area, to pre-disaster conditions. The ERFO Program is intended to supplement the commitment of resources by Federal agencies to help pay unusually heavy expenses resulting from extraordinary conditions.

4.6 U.S. ARMY CORPS OF ENGINEERS

There are two potential authorities - support for others (SFO) and emergency operations by which the U.S. Army Corps of Engineers (USACE) could participate in the implementation of a structural solution to the roads acting as dikes in the Devils Lake basin.

The USACE could undertake the work to protect the roads acting as dams as the agent of the State of North Dakota or another Federal agency. The requesting agency would be responsible for program planning, development, budgetary justification, and legal liability and for all costs of the services provided. If services are provided to the State, rather than another Federal agency,

funding for the work must be deposited in the Treasury in advance of the USACE performing the work.

In addition, the USACE may provide emergency assistance to save human life, prevent immediate human suffering, or mitigate property damage in certain cases where the nature of a disaster or emergency exceeds the capability of state or local interests. The USACE requires that the requested emergency assistance must be technically feasible, economically justified and mitigate a significant and immediate flood threat to life and improved property. Application of this authority for construction of permanent measures requires cost sharing by local interests. Given that the current situation does not appear to meet the economic justification criteria, the USACE would require specific Congressional direction and appropriations to undertake the work without regard to economic justification.

5.1 APPROACH FOR TRUST LANDS

A significant percentage of the area that would be inundated in the St. Michael Interior Area (Area 2) under the equalization solution would be trust lands. Trust lands refer to Indian land that is held in trust by the United States for individuals or tribes. The BIA administers leases for the individual landowner or the tribe if they own the land. In many instances, these lands are leased to residents of the Spirit Lake Nation for agricultural purposes. If these areas were inundated, an approach would have to be developed and deployed. During the development of the approach, decisions must be made regarding what parties if any would be compensated. If compensation were deemed appropriate, the value of the compensation would have to be developed using a pre-determined valuation process.

5.2 CRITICAL ROAD DEFINITION

One of the key components to determining funding possibilities for a given road segment is the road's classification as a critical road. FHWA ER funding is available to raise the grades of critical Federal-Aid Highways faced with long-term loss of use due to an unprecedented rise in basin water level when basin flooding is considered a natural disaster for the purpose of the ER Program. Only those routes that are critical to restoring traffic service are eligible for grade raises. Factors to take into account in evaluating critical routes may include functional classification; provision of essential community services such as access for school, ambulance, fire, and mail vehicles; availability of alternate routes; and length of detours. The State DEM must work with NDDOT, the BIA and the Spirit Lake Nation to identify the critical or essential BIA routes, and work in consultation with the FHWA to determine future eligibility of emergency repairs for these identified routes. The Federal Lands Highway divisions based on input from the BIA and in consultation with their Washington office determine critical Federal road eligible for ERFO funding.

6.1 COST METHODOLOGY

The costs included in this report are a composite of sound historical cost estimates and new cost analyses performed for this report. Background information for selected columns in the tables included in Section 6.2 is provided below.

6.1.1 Length of Road as Dike and Height of Roadbed

The length of each road segment acting as a dike was calculated using the Geographic Information System (GIS) created by FEMA in 1999-2000. In many instances there are a series of road segments within the listed segment that actually perform as dikes. The height of the roadbed column shows the lowest elevation in feet of any point along the road segment is based on the NGVD 1929 datum.

6.1.2 Owning Agency

The owning agency indicates the agency that is responsible for all construction, enhancement, operation and maintenance of the road segment. Based on the owner of the road segment, different funding mechanisms are possible. Table 1 presents a preliminary summary of possible funding sources.

Table 1 – Potential Funding Source Summary

Owning Agency	Potential Funding Sources
State	State funds
	Regular Federal aid
	Federal ER
County/Jurisdiction	County funds
	Regular Federal aid
	Federal ER
	FEMA
BIA	IRR Funds
	ERFO
	Road Maintenance Funds
	Tribal Funds

6.1.3 Cost Detail Columns

The costs shown in Tables 2 and 3 of Section 6.2 are for Areas 1 and 2 and are shown in units of millions of dollars. There are six cost classifications: Roads, Dikes, Utilities and Infrastructure, Property Acquisition, Land Cost, and Economic Losses.

Costs for roads and dikes were extracted from the May 2000 report and the backup information that was used to create the report. The costs for parallel dikes include the costs of rights-of-way and other property acquisition costs associated with building the parallel dikes. These costs were evaluated during meetings in Bismarck, ND on September 5 and 6, 2001 by a working group within the Task Force.

Utilities and Infrastructure include costs for power lines and electrical transmission structures such as substations, water and sewer line realignments, and other miscellaneous items. Property acquisition was calculated using an aggregated pre-flood Fair Market Value from the risk assessment conducted by FEMA in 2000. Costs that may be realized by a community due to relocated structures or people are not included in this column. In addition, losses that may be realized by communities such as lost tax revenue are not included under Property Acquisition.

The land cost data are only shown for the equalization option and were derived by determining the area using the elevation data obtained through Light Detection And Ranging (LiDAR) during the Risk Assessment Study conducted by FEMA in 2000. The cost of land was determined using data compiled by the North Dakota Agricultural Statistics Service (NASS) in March 2000. Since land use was not able to be determined within the scope of the task force's work, the average value of rented land for non-irrigated cropland was used. This category provides the highest value of all the categories surveyed by NASS. The cost-per-acre values used are \$337.00 and \$340.00 for Benson and Ramsey Counties, respectively.

The economic losses column includes costs associated with loss of income from inundated agricultural property, losses to utility companies due to the reduction in the customer base, losses to the community tax base, and other similar costs. These costs are included as an attempt to define the total cost of the technical alternatives presented in this report. The inclusion of these costs does not necessarily indicate that these costs will be reimbursed through any governmental funding mechanism.